G-475

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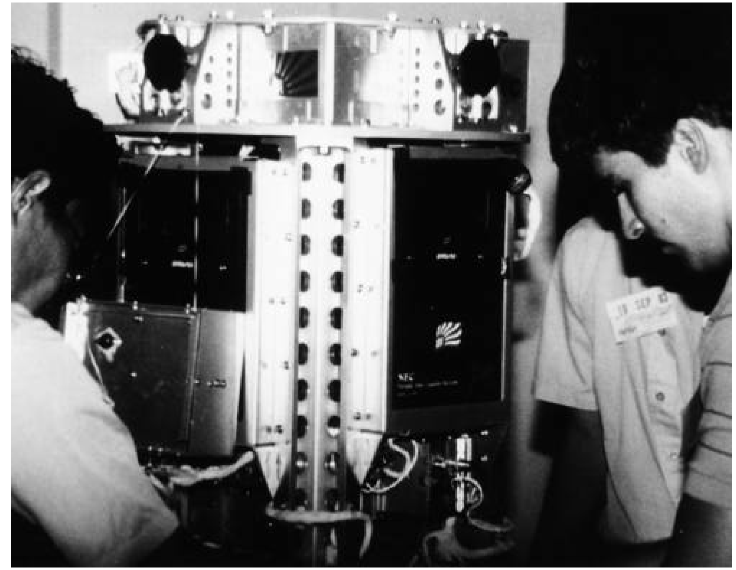
Customer: The Asahi Shimbun;
Shigeru Kimura
Payload Manager: Shigeru Kimura
NASA Tech Mgr: Lawrence R. Thomas
Mission: STS-8, August 30, 1983

Seemingly simple, making the first snowflakes in space was actually a sophisticated engineering task. Data from the Asahi Shimbun's unsuccessful first attempt on STS-6 revealed that the extreme cold in space had lowered the water in their experiment to minus seven degrees Centigrade (19°F), much colder than anticipated. Consequently, the heaters could not heat the water enough to generate water vapor for snow crystals. Engineers also suspected that since there is no convection in zero gravity, the water vapor could not have spread to the field-of-view of the cameras anyway. After their evaluation, engineers tripled the power of the heaters and added a small fan, and NASA arranged to turn on the experiment as early in the mission as possible. The answer, observed and recorded by home video equipment, contributed data on the growth of semiconductor crystals and other materials from vapor sources in space. The value of the orbiter's ability to return an experiment to Earth for evaluation and modification was again demonstrated by the successful reflight of this payload.



Shigeru Kimura (L) and Dave Miller inspected the experiment prior to its reflight.

G-346

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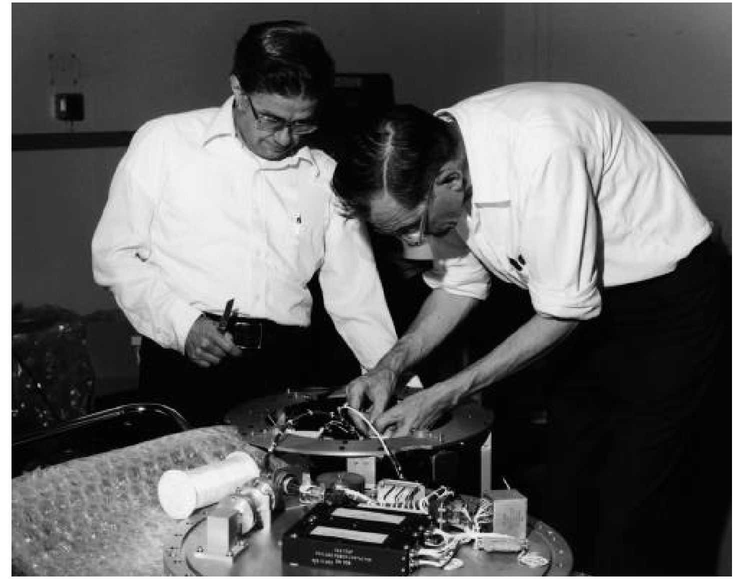
Customer: Goddard Space Flight Center; Noel W. Hinners
Payload Mgr: John W. Adolphsen
NASA Tech Mgr: Norman E. Peterson, Jr.
Mission: STS-8, August 30, 1983

The Cosmic Ray Upset Experiment (CRUX) in G-346 was designed to study how cosmic rays—highly charged particles in space—upset microcomputer chip memory circuits. A number of flight anomalies in NASA and DoD spacecraft systems have been attributed to these cosmic ray upsets. When a single highly charged particle deposits or loses energy as it passes through a sensitive volume in a memory cell, a soft error, or change in logic state can occur. In some technologies, a particle initiates a "latchup" condition within the bulk of the microcircuit, resulting in high-current drain by the microcircuit and catastrophic failure. Since the rate of such single event upsets increases as the scale of integration (number of transistors per chip) increases, the problem has become more important as devices have become more and more dense. The purpose of CRUX was to validate a model which could predict the upset rate of a given microcircuit type in a given orbit.



(L to R) CRUX I and II's technician and design engineer, George Schoppet and John Yagelowich.

G-347

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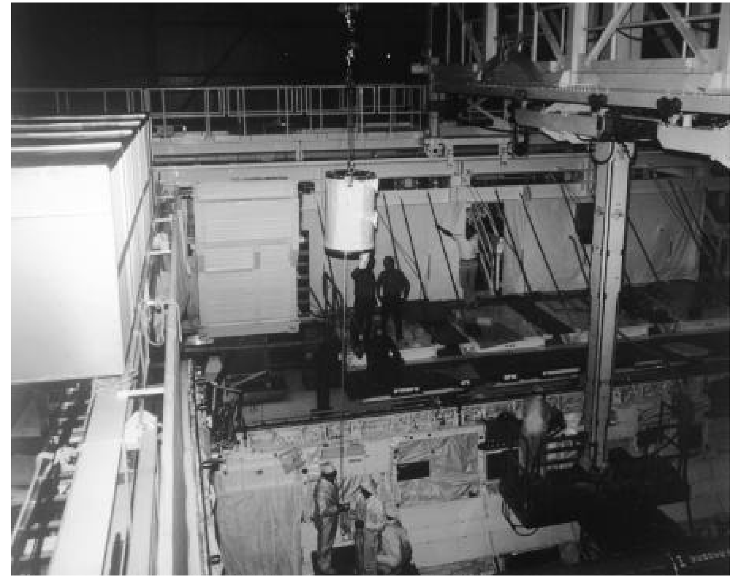
Customer: Goddard Space Flight Center;
Noel W. Hinners
Payload Mgr: Robert Kreplin
NASA Tech Mgr: Mark D. Goans
Mission: STS-8, August 30, 1983

Once again, the Ultraviolet Photographic Test Package (previously flown as G-345 on STS-7) gathered information on how the orbiter environment affects ultraviolet (UV)-sensitive photographic emulsions. Clouds of ions that blacken UV emulsions can be produced in space through the action of solar ultraviolet radiation on a cloud of gas emanating from the payload or vehicle. If, in addition, telescope apertures face the direction of the motion of the spacecraft, ions are scooped up and rammed into the instrument's interior. There they react with photographic materials. The unusual flight attitude taken by STS-8 allowed an excellent evaluation of such an ion ram effect.



G-347 being lowered into the cargo bay.

G-348

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Customer: Goddard Space Flight Center;
Noel W. Hinners
Payload Mgr: Roy McIntosh
NASA Tech Mgr: Mark D. Goans
Mission: STS-8, August 8, 1983

On several occasions, NASA's Space Shuttles have returned from missions with their outercoatings and thermal blanket coverings dramatically changed. The white outercoating on the bay structures and fixtures came back covered with powder; the shiny gold thermal blankets on the payloads were dulled; and both coatings were significantly thinner. GAS payload G-348 investigated such changes caused by atomic oxygen erosion. Present at low orbital altitudes, atomic oxygen (an oxygen atom) tears down certain materials. G-348 measured the mass loss of carbon and osmium, two materials known to readily oxidize. The results were expected to provide insights for future low-orbit missions, such as the Space Station which would use a carbon-based epoxy in its construction.

The heart of the atomic oxygen test was this sensing element mounted on the GAS container lid.